

**DIRECT ANTIFREEZE COOLED FUEL CELL**

**Abstract of the Disclosure**

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5 A direct antifreeze cooled fuel cell is disclosed for  
producing electrical energy from reducing and process  
oxidant fluid streams that includes an electrolyte secured  
between an anode catalyst and a cathode catalyst; a porous  
anode substrate secured in direct fluid communication with  
and supporting the anode catalyst; a porous wetproofed  
cathode substrate secured in direct fluid communication  
with and supporting the cathode catalyst; a porous water  
transport plate secured in direct fluid communication with  
10 the porous cathode substrate; and, a direct antifreeze  
solution passing through the porous water transport plate.  
In operation of the fuel cell, because product water  
generated electrochemically at the cathode catalyst flows  
away from the cathode catalyst into the porous cathode  
15 substrate and into the porous water transport plate and  
because the porous cathode substrate is wetproofed, the  
antifreeze solution passing through the porous water  
transport plate remains essentially within the water  
transport plate. A preferred direct antifreeze solution is  
20 glycerol. In a preferred embodiment, the direct antifreeze  
solution passing through the water transport plate may be  
directed to flow at a pressure that is less than a pressure  
of the process oxidant stream passing adjacent the cathode  
substrate and water transport plate to further minimize  
25 movement of the antifreeze solution from the water  
transport plate to the cathode catalyst.

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